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By Elizabeth Miller 3/26/01
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael P. Caren et al. Group Art Unit: 1656

Continuing Application for Pending Examiner: Jeffrey Siew
Prior Application Serial No. 09/300,589

Filed: April 27, 1999

Title: METHOD OF PERFORMING ARRAY-BASED HYBRIDIZATION ASSAYS USING THERMAL INKJET DEPOSITION OF SAMPLE FLUIDS

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

PRELIMINARY AMENDMENT

Please amend the present application by canceling claims 1-21 and replacing them with new claims 22-43 below:

22. A method for depositing a quantity of fluid containing a nucleic acid or polypeptide, on a substrate surface having a binding agent stably associated therewith, said method comprising:

positioning a thermal inkjet head filled with said nucleic acid or polypeptide containing fluid in opposing relation to said substrate surface; and

actuating said thermal inkjet head in a manner sufficient to expel said quantity of fluid onto said substrate surface;

whereby said quantity of fluid is deposited on said substrate surface.

23. The method according to Claim 22, wherein said fluid is heated prior to said actuation.

24. The method according to Claim 22, wherein an energy pulse of between 1.0 to 100 μJ is supplied to the thermal inkjet head to expel the quantity of fluid.

25. The method according to Claim 24, wherein said biomolecule is a nucleic acid.

26. The method according to Claim 22, wherein said fluid substrate surface is the surface of an array.

27. A method for depositing a quantity of fluid containing a nucleic acid or polypeptide on an array surface, said method comprising:

loading said fluid into a thermal inkjet head comprising an orifice and a firing chamber by contacting said orifice with said fluid in a manner sufficient for said fluid composition to flow through said orifice into said firing chamber;

positioning said thermal inkjet head filled with said fluid in opposing relation to said array surface; and

actuating said thermal inkjet head in a manner sufficient to expel said quantity of fluid onto said array surface;

whereby said quantity of fluid is deposited on said array surface.

28. The method according to Claim 27, wherein said method further comprises applying back pressure to said head during said contacting step.

29. The method according to Claim 27, wherein said fluid comprises a biomolecule.

30. The method according to Claim 29, wherein said biomolecule is a nucleic acid.

31. A method for introducing a fluid sample to a binding agent, said method comprising:

positioning a thermal inkjet head filled with said fluid sample in opposing relation to a surface of an array, wherein said array comprises a plurality of binding agents stably associated with said surface;

actuating said thermal inkjet head in a manner sufficient to expel a quantity of said fluid sample onto said array surface; and

allowing interaction between said fluid sample and said binding agent.

32. The method according to Claim 31, wherein an energy pulse of between 1.0 to 100 μJ is supplied to the thermal inkjet head to expel the quantity of fluid.

33. The method according to Claim 31, wherein an energy pulse of between 1.5 to 15 μJ is supplied to the thermal inkjet head to expel the quantity of fluid said biomolecule is a nucleic acid.

34. A method for detecting the presence of a nucleic acid or polypeptide in a fluid sample, said method comprising:

positioning a thermal inkjet head filled with said fluid sample in opposing relation to a surface of an array, wherein said array comprises a plurality of binding agents stably associated with said surface and at least one of said binding agents specifically binds to said nucleic acid or polypeptide;

actuating said thermal inkjet head in a manner sufficient to expel a quantity of said fluid sample onto said array surface; and

detecting the presence of any binding complexes between said at least one binding agent and said analyte on said array surface;

whereby the presence of said analyte in said fluid sample is detected.

35. The method according to Claim 34, wherein between 1.0 to 100 μJ is supplied to the thermal inkjet head to expel the quantity of fluid.

36. The method according to Claim 35, wherein between an energy pulse of 1.5 to 15 μJ is supplied to the thermal inkjet head to expel the quantity of fluid said analyte is a nucleic acid.

37. The method according to Claim 34, wherein said method further comprises heating said fluid sample prior to said actuating.

38. The method according to Claim 34, wherein said fluid sample comprises a surfactant.

39. A method for performing an array-based hybridization assay, said method comprising:

(a) positioning a thermal inkjet head filled with a fluid nucleic acid sample in opposing relation to a surface of an array, wherein said array comprises a plurality of nucleic acids stably associated with said surface;

(b) actuating said thermal inkjet head by supplying an energy pulse of between 1.0 to 100 μJ so as to expel a quantity of said fluid sample onto said array surface to produce a sample contacted array;

(c) maintaining said sample contacted array under hybridization conditions for a period of time sufficient for any complementary nucleic acids to hybridize to each other;

(d) washing the surface of said array; and

(e) detecting the presence of any double-stranded nucleic acids on said array surface.

40. The method according to Claim 39, wherein said method further comprises heating said fluid sample prior to said actuating.

41. The method according to Claim 39, wherein said quantity does not exceed 200 pico liters.

42. The method according to Claim 39 wherein the energy pulse is between 1.5 to 15 μJ and the fluid sample contains a surfactant.

43. The method according to Claim 39 additionally comprising depositing from a thermal inkjet head a quantity of a diluent solution onto a same location on the array as the quantity of sample fluid.

Remarks

The above new claims more clearly define the invention of the present continuation application. If the Examiner is of the view that there are any issues which might be resolved by means of a telephone conference, he is invited to call Gordon Stewart at (650)485-2386.

Respectfully submitted,

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